

MICHAEL SCOTT WARREN

PERSONAL

Date of birth : October 10, 1966
Place of birth : Sacramento, California
Marital Status : Single

Address : Theoretical Astrophysics
Mail Stop B288,
Los Alamos National Laboratory
Los Alamos, N.M. 87545
phone : (505) 665-5023
email : msw@lanl.gov
URL : <http://qso.lanl.gov/~msw>

Home : 60 Camino de los Montoyas
Santa Fe, N.M. 87506-7088
phone : (505) 989-4506
email : MikeW@rren.org
URL : <http://infomesa.com/~msw>

Degrees :

Ph.D. Physics	University
M.S. Physics	University
B.Sc. Physics	California
B.Sc. Engineering	California

EDUCATION

Postgraduate	University of California, Santa Barbara	1988–1994
Undergraduate	California Institute of Technology	1984–1988
Secondary School	Stevens High School, Rapid City, S.D.	1981–1984

EMPLOYMENT

Staff Member	Los Alamos National Laboratory	Mar. 1995–Present
Sr. Software Engineer	Digital Island/Exodus	Dec. 1999–Present
Research Assistant Prof.	University of New Mexico	Sep. 1995–June 1996
Postdoctoral Fellow	Los Alamos National Laboratory	Mar. 1994–Mar. 1995
GRA	Los Alamos National Laboratory	Mar. 1990–1994
Teaching Assistant	University of California, Santa Barbara	Oct. 1988–1990
Research Assistant	California Institute of Technology	Summers 1986–1989

MEMBERSHIPS & AWARDS

Los Alamos Information Architecture Linux Team, American Astronomical Society, Society of Industrial and Applied Mathematics, IEEE Computer Society. 1998 Gordon Bell Prize in Price/Performance category, 1997 Gordon Bell Prize in both Performance and Price/Performance categories. Two 1997 Los Alamos Technology Transfer Awards. Los Alamos Achievement Award in 1996, 1997, 1998 and 1999. Best Student Paper Award, Supercomputing '93. Co-Winner of the \$35,000 Intel Grand Challenge Computing Award (1992). Co-Winner of the Gordon Bell Prize for significant achievement in parallel processing (1992).

PUBLICATIONS

Refereed Publications

- M. S. Warren, E. Weigle & W. Feng *High-Density Computing: A 240-Processor Beowulf in One Cubic Meter* In SC '02, Los Alamitos, 2002. IEEE Comp. Soc. (submitted)
- C. L Fryer & M. S. Warren, *Core-collapse in Three Dimensions*, Ap. J. Lett., 2002 (submitted)
- W. Feng, M. S. Warren & E. Weigle, *Honey, I Shrunk the Beowulf!*, In Proceedings of the 2002 International Conference On Parallel Processing, 2002. (in press)
- P. Ploumans, G. S. Winckelmans, J. K. Salmon, A. Leonard, M. S. Warren *Vortex Methods for High-Resolution Simulation of Three-Dimensional Bluff Body Flows; Application to the Sphere at Re=300, 500 and 1000* J. Comp. Phys., 2002 (in press)
- C. S. Frenk, S. D. M. White, P. Bode, R. J. Bond, M. S. Warren, et al. *The Santa Barbara cluster comparison project: a test of cosmological hydrodynamics codes*. Ap. J., **525**:554, 1999.
- M. S. Warren, T. C. Germann, P. S. Lomdahl, D. M. Beazley & J. K. Salmon *Avalon: An Alpha/Linux Cluster Achieves 10 Gflops for \$150k*. In Supercomputing '98, Los Alamitos, 1998. IEEE Comp. Soc.
- M. S. Warren, J. K. Salmon, D. J. Becker, M. P. Goda, T. Sterling, & G. S. Winckelmans. *Pentium Pro inside: I. a treecode at 430 Gigaflops on ASCI Red, II. Price/performance of \$50/Mflop on Loki and Hyglac*. In Supercomputing '97, Los Alamitos, 1997. IEEE Comp. Soc.
- M. S. Warren, D. J. Becker, M. P. Goda, J. K. Salmon, & T. Sterling. *Parallel supercomputing with commodity components*. In H. R. Arabnia, editor, Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'97), pages 1372-1381, 1997.
- B. C. Bromley, M. S. Warren, & W. H. Zurek. *Estimating omega from galaxy redshifts: Linear flow distortions and nonlinear clustering*. Ap. J. (Letters), **475**:414-420, 1997.
- J. Salmon and M. S. Warren. *Parallel out-of-core methods for N-body simulation*. In 8th SIAM Conf. on Parallel Processing for Scientific Computing, Philadelphia, 1997. SIAM.
- T. G. Brainerd, B. C. Bromley, M. S. Warren, & W. H. Zurek. *Velocity dispersion and the redshift space power spectrum*. Ap. J. (Letters), **464**, 1996.
- M. S. Warren and J. K. Salmon. *A portable parallel particle program*. Computer Physics Communications, **87**:266-290, 1995.
- M. S. Warren and J. K. Salmon. *A parallel, portable and versatile treecode*. In Seventh SIAM Conference on Parallel Processing for Scientific Computing, pages 319-324, Philadelphia, 1995. SIAM.
- G. S. Winckelmans, J. K. Salmon, M. S. Warren, & A. Leonard. *The fast solution of three-dimensional fluid dynamical N-body problems using parallel tree codes: vortex element method and boundary element method*. In Seventh SIAM Conference on Parallel Processing for Scientific Computing, pages 301-306, Philadelphia, 1995. SIAM.
- J. K. Salmon and M. S. Warren. *Skeletons from the treecode closet*. J. Comp. Phys., **111**:136-155, 1994.
- J. K. Salmon, M. S. Warren, & G. S. Winckelmans. *Fast parallel treecodes for gravitational and fluid dynamical N-body problems*. Intl. J. Supercomputer Appl., **8**:129-142, 1994.
- W. H. Zurek, P. J. Quinn, J. K. Salmon, & M. S. Warren. *Large scale structure after COBE: Peculiar velocities and correlations of cold dark matter halos*. Ap. J., **431**:559-568, 1994.
- M. S. Warren and J. K. Salmon. *A parallel hashed oct-tree N-body algorithm*. In Supercomputing '93, pages 12-21, Los Alamitos, 1993. IEEE Comp. Soc.
- M. S. Warren, P. J. Quinn, J. K. Salmon, & W. H. Zurek. *Dark halos formed via dissipationless collapse: I. Shapes and alignment of angular momentum*. Ap. J., **399**:405-425, 1992.

M. S. Warren and J. K. Salmon. Astrophysical N-body simulations using hierarchical tree data structures. In Supercomputing '92, pages 570-576, Los Alamitos, 1992. IEEE Comp. Soc.

M. S. Warren and J. K. Salmon. *An O(N log N) hypercube N-body integrator*. In G. C. Fox, editor, Proceedings of the Third Conference on Hypercube Computers and Applications, page 971, New York, 1988. ACM Press.

Conference Proceedings and others

Tullis, T.E. , J. Salmon, N Kato, and M Warren, *The application of fast multipole methods to increase the efficiency of a single-fault numerical earthquake model*, Eos. Trans. Am. Geophys. Union, Fall Meeting Suppl., 80, F924, 1999.

T. Sterling, T. Cwik, D. Becker, J. Salmon, M. Warren, & B. Nitzberg. *An assessment of Beowulf-class computing for NASA requirements: Initial findings from the first NASA workshop on Beowulf-class clustered computing*. In Proceedings, IEEE Aerospace Conference. March 21-28, Aspen CO, 1998.

J. Hill, M. Warren, & M. P. Goda. *I'm not going to pay a lot for this supercomputer!*. Linux Journal, 45, 1998.

M. S. Warren and M. P. Goda. *Loki — commodity parallel processing*. <http://loki-www.lanl.gov/>

M. S. Warren and J. K. Salmon. *Abstractions and techniques for parallel N-body simulation*. In Parallel Object Oriented Methods and Applications (POOMA) '96, 1996.

B. C. Bromley, T. G. Brainerd, M. S. Warren, W. H. Zurek, & P. J. Quinn. *On cluster cores and redshift-space power spectra*. In S. Maurogordato, editor, Clustering in the Universe, Moriond Proceedings, 1996.

B. C. Bromley, T. G. Brainerd, M. S. Warren, & W. H. Zurek. *Cosmic structure on small scales: Results on cluster cores and redshift-space power spectra*. In P. Coles, editor, Mapping, Measuring and Modelling the Universe, Valencia Proceedings, 1996.

B. C. Bromley, R. Laflamme, M. S. Warren, & W. H. Zurek. *The distribution of matter around luminous galaxies*. In Proceedings of the XXXIth Moriond Meeting, 1996.

B. C. Bromley, M. S. Warren, W. H. Zurek, & P. J. Quinn. *Rich cluster simulation: Dynamics and mass estimates*. In S. Holt and D. Bennett, editors, Dark Matter, Proceedings of the Fifth Annual Astrophysics Conference in Maryland, pages 433-436, New York, 1995. AIP.

M. S. Warren, W. H. Zurek, B. C. Bromley, T. G. Brainerd, J. K. Salmon, & P. J. Quinn. *N-body simulation of the cold dark matter cosmology*. In J. Cohen, editor, Images of Earth and Space: The Role of Visualization in NASA Science, 1995.

M. S. Warren and W. H. Zurek. *Scalable hierarchical particle algorithms for galaxy formation and accretion astrophysics*. NASA HPCC Annual Report, 1995.

B. C. Bromley, R. Laflamme, M. S. Warren, & W. H. Zurek. *Testing theories of structure formation*. In V. Trimble and A. Reisenegger, editors, Clusters, Lensing & the Future of the Universe, Proceedings of the 1995 Meeting of the Astronomical Society of the Pacific, 1995.

B. C. Bromley, T. G. Brainerd, R. Laflamme, & M. S. Warren. *Peculiar velocities in numerical simulations: An examination of redshift-space power*. In P. J. Quinn, editor, Heron Island Workshop on Peculiar Velocities, 1995.

B. C. Bromley, T. G. Brainerd, M. S. Warren, W. H. Zurek, & P. J. Quinn. *On cluster cores and power spectra*. In "Clustering in the Universe," Proceedings of the XXXth Moriond Meeting, 1995.

G. S. Winckelmans, J. K. Salmon, A. Leonard, & M. S. Warren. *Three-dimensional vortex particle and panel methods: fast tree-code solvers with active error control for arbitrary distributions/geometries*. In Forum on Vortex Methods for Engineering Applications, pages 23-43, 1995.

- G. S. Winckelmans, J. K. Salmon, M. S. Warren, A. Leonard, & B. Jodoin. *Application of fast parallel and sequential tree codes to computing three-dimensional flows with vortex element and boundary element methods*. In Vortex Flows and Related Numerical Methods, Montreal, 1995.
- W. H. Zurek, B. C. Bromley, & M. S. Warren. *Second coming of cold dark matter?* In S. Holt and D. Bennett, editors, Dark Matter, Proceedings of the Fifth Annual Astrophysics Conference in Maryland, pages 397-406, New York, 1995. AIP.
- J. K. Salmon, A. Leonard, M. S. Warren, & G. S. Winckelmans. *Parallel N-body methods for parallel supercomputers*. CSCC Annual Report, 1995.
- M. S. Warren. *Experimental Cosmology Using Fast Parallel N-body Methods*. PhD thesis, University of California, Santa Barbara, 1994.
- M. S. Warren and W. H. Zurek. *Scalable hierarchical particle algorithms for galaxy formation and accretion astrophysics*. NASA HPCC Annual Report, 1994.
- M. S. Warren and J. K. Salmon. *A fast tree code for many-body problems*. In N. G. Cooper, editor, Los Alamos Science, volume 22, pages 88-97. Los Alamos National Laboratory, Los Alamos, NM, 1994.
- M. S. Warren, M. P. Goda, J. K. Salmon, & M. B. Davies. *Impact of Shoemaker-Levy 9 with Jupiter*. CSCC Annual Report, 1994.
- J. K. Salmon, A. Leonard, M. B. Davies, M. S. Warren, & G. S. Winckelmans. *Fast particle algorithms for computational fluid dynamics: Smooth-particle hydrodynamics and vortex particle methods*. CSCC Annual Report, 1994.
- W. H. Zurek and M. S. Warren. *Experimental cosmology and the puzzle of large-scale structure*. In N. G. Cooper, editor, Los Alamos Science, volume 22, pages 58-81. Los Alamos National Laboratory, Los Alamos, NM, 1994.
- J. K. Salmon and M. S. Warren. *Studying galaxy formation with N-body simulations and “treecodes”*. NSF HPCC Science Highlights, 1993.
- W. H. Zurek, M. S. Warren, P. J. Quinn, & J. K. Salmon. *The second coming of cold dark matter?* In F. R. Bouchet, editor, Proceedings of the 9th IAP Meeting, Paris, France, 1993. IAP.
- M. S. Warren and J. K. Salmon. *N-body simulations on the touchstone delta*. CSCC Annual Report, 1992.
- D. P. Fullagar, P. J. Quinn, C. J. Grillmair, J. K. Salmon, & M. S. Warren. *N-body methods on MIMD supercomputers: Astrophysics on the Intel touchstone delta*. In Fifth Australian Supercomputing Conference, 1992.
- M. S. Warren and J. K. Salmon. *A parallel treecode for gravitational N-body simulations with up to 20 million particles*. B. A. A. S., **23**(4):1345, 1991.
- M. S. Warren, W. H. Zurek, P. J. Quinn, & J. K. Salmon. *The shape of the invisible halo: N-body simulations on parallel supercomputers*. In S. Holt, V. Trimble, & C. Bennett, editors, After the First Three Minutes Workshop Proceedings. AIP Press, New York, 1991.
- W. H. Zurek, M. S. Warren, P. J. Quinn, & J. K. Salmon. *The shape and kinematics of dark halos formed via dissipationless collapse*. B. A. A. S., **23**(4):1345, 1991.
- P. J. Quinn, W. H. Zurek, J. K. Salmon, & M. S. Warren. *The formation of halos via mergers: the organized and organizing dynamics of mergers*. In A. Toomre and R. Wielen, editors, Proceedings of 1989 Heidelberg Conference on Dynamics and Interactions of Galaxies. Springer-Verlag, New York, 1990.
- J. K. Salmon, P. J. Quinn, & M. S. Warren. *Using parallel computers for very large N-body simulations: Shell formation using 180k particles*. In A. Toomre and R. Wielen, editors, Proceedings of 1989 Heidelberg Conference on Dynamics and Interactions of Galaxies. Springer-Verlag, New York, 1990.